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National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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CRUISE REPORT

North Pacific Cooperative Fisheries of Japan Vessel
Tsune Maru No. 31
Cruise No. 89-01

Japan-U.S. cooperative longline survey for sablefish and Pacific cod in the Aleutian region, eastern Bering Sea, and Gulf of Alaska, 1989.

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INTRODUCTION

Since 1978, Japan and the United States have conducted an annual, cooperative longline survey in the northeastern Pacific Ocean along Alaska's continental slope. Formerly (1978-88), the Japanese government's Fishery Agency of Japan was the Japanese agency responsible for the survey. In 1989, however, the survey was conducted by a private Japanese organization, the North Pacific Cooperative Fisheries of Japan, in cooperation with the Alaska Fisheries Science Center (AFSC) of the U.S. National Marine Fisheries Service. The 1989 survey was conducted between May and September using the Tsune Maru No. 31, a commercial Japanese longline vessel provided by the North Pacific Cooperative Fisheries of Japan. As in previous years, the survey was directed primarily at sablefish (Anoplopoma fimbria) and Pacific cod (Gadus macrocephalus) between depths of 100 m and 1,000 m. Areas surveyed included the western Aleutians, eastern Aleutians, Regions I, II, III, and IV of the eastern Bering Sea, and the following International North Pacific Fisheries Commission (INPFC) statistical areas in the Gulf of Alaska: Shumagin, Chirikof, Kodiak, Yakutat, and Southeastern (Fig. 1). These surveys now provide 11 consecutive years (1979-89) of standardized data for the Gulf of Alaska and Aleutian region, and 8 years (1982-89) of standardized data for the eastern Bering Sea. (The first year of the survey, 1978, was experimental and could not be used for population assessment purposes.)

OBJECTIVES

1. Monitor annual changes in the relative abundance and size composition of sablefish and Pacific cod along the continental slope of Alaska.

2. Monitor annual changes in stock condition of other major fish species caught in the survey, including Pacific halibut (Hippoglossus stenolepis), arrowtooth flounder (Atheresthes stomias), Greenland turbot (Reinhardtius hippoglossoides), rockfish (Sebastes spp.), thornyheads (Sebastolobus spp.), and grenadiers (Macrouridae).

3. Tag and release sablefish throughout the cruise to determine migration patterns.

4. Collect sablefish otoliths to study age composition of the stocks.

ITINERARY

10 May	Departed Ishinomaki, Japan.
11-15 May	In transit to western Aleutian Islands.
16 May-6 June	Fished 22 stations in the Aleutian Islands, eastern Bering Sea, and western Gulf of Alaska.
7-11 June	Mechanical problems (fathometer breakdown); travelled to Dutch Harbor for repairs.
12-20 June	Fished 8 stations in the eastern Bering Sea.
21 June	In port, Dutch Harbor, to exchange scientific personnel and restock vessel.
22 June-20 July	Fished 27 stations in the Aleutian Islands and eastern Bering Sea.
21 July	In port, Dutch Harbor, to exchange scientific personnel and restock vessel.
22 July-17 Aug.	Fished 27 stations in the eastern Bering Sea and western Gulf of Alaska.
18-19 Aug.	In port, Seward, to exchange scientific personnel and restock vessel.
20 Aug.-12 Sept.	Fished 24 stations in the eastern Gulf of Alaska.
13-14 Sept.	In transit to Seattle, Washington.

15 Sept. Arrived Seattle; end cruise.

METHODS

The methods used in 1989 were similar to those used in previous years. The Tsune Maru No. 31, a 50.70 m (166 ft) longline vessel, carried a crew of 26 Japanese nationals. One station was occupied each day. At each station, one longline 16 km (8.6 nmi) long was set and retrieved. The longline consisted of 160 hachis (Japanese term for "skates" or lengths of longline), each 100 m (328 ft) long, tied together. Halibut anchors and surface buoys were attached at the beginning and end of the longline and one-third and two-thirds of the way along the line. A 3-kg (7 lb) rock anchored each hachi. Each hachi had 45 "J" style hooks spaced at 2 m intervals along the line. Thus, 7,200 hooks were fished each day at a station. The hooks were baited with squid and were attached to the line by 1.2 m (47 in) gangions. As in previous years, a total of 108 stations was planned for the survey.

The vessel generally attempted to fish depths between 100 m and 1,000 m (55-548 fm) at each station. These depths correspond to the bathymetric distribution of most commercial-size sablefish in Alaskan waters. Because of bottom irregularities and the varied angle of the continental slope, it was often impossible to fish the complete depth range at all stations. The longline was usually set starting in shallow water, and then laid seaward across the isobaths of the continental slope into deeper water. At some stations, where Pacific cod was the primary species of interest and the angle of the continental slope was gradual, the entire longline was set at depths less than 400 m. Most of these shallow stations were in the eastern Bering Sea.

At each station, the soak time (time between set and retrieval) of an individual hachi depended upon the hachi's location in the longline. Setting the gear usually began in the early morning (0400-0500 hours) and finished within 1 h. The vessel then returned to the starting position, waited until the first hachi had been in the water for 3 h, and began hauling the gear. Retrieval of the entire longline usually lasted 6-7 h. Thus, soak time varied from 3 h at the beginning of the longline to 8 or 9 h at the end.

The catch was tallied by species and hachi number as the longline was brought aboard. Also, the depth at which the fish were caught was estimated by measuring the depth of water under the vessel every fifth hachi.

The catch was then separated into individual species for further sampling. Pacific halibut were landed without a gaff, measured for length, and immediately released. Other species

were retained and weighed. Commonly caught fish were individually measured to determine length frequencies. These included sablefish, Pacific cod, arrowtooth flounder, Greenland turbot, rougheye rockfish (Sebastes aleutianus), shortraker rockfish (S. borealis), shortspine thornyhead (Sebastolobus alascanus), giant grenadier (Albatrossia pectoralis), and Pacific grenadier (Coryphaenoides acrolepis). Sablefish and Pacific cod were separated by sex and depth stratum before they were measured.

At most stations, a subsample of sablefish was held in live tanks, and then tagged and released. Only robust, uninjured fish, usually <65 cm in fork length, were tagged. The tags used were plastic Floy[1] anchor tags, as in previous years. The AFSC Resource Assessment and Conservation Engineering Division supplied the tags in the Aleutian region, eastern Bering Sea, and western half of the Gulf of Alaska (labeled "U.S. National Marine Fisheries Reward, Seattle, Washington U.S.A."). The AFSC Auke Bay Laboratory supplied the tags in the eastern half of the Gulf of Alaska (labeled "U.S. National Marine Fisheries Reward, Auke Bay, Alaska USA").

Sablefish otoliths were collected throughout the cruise for the AFSC. Generally, two otoliths were collected per fish. In the Aleutian Islands and eastern Bering Sea, otoliths were taken from five fish per centimeter length per sex in each of the six areas surveyed, resulting in a total of six separate otolith collections. In the Gulf of Alaska, the otolith collection scheme was somewhat different: otoliths were taken from five fish per centimeter length per sex in each of 3 depth strata (101-200 m, 201-400 m, and 401-1,000 m) in 3 areas (Shumagin, Kodiak, and Southeastern), resulting in a total of nine separate otolith collections for this region.

After completion of sampling, grenadiers were discarded because they were not marketable, and the rest of the catch was processed and frozen for later sale in Japan as food. Sale of the fish helped to defray the Japanese fishing cooperative's cost of conducting the survey.

Scientists from the AFSC will analyze the sablefish data collected on the survey by calculating the sablefish catch per hachi. Catch per hachi, a measure of relative abundance, is calculated by dividing the number of fish caught by the number of hachis fished. This calculation is done for each area and by 100 m increments from 100 m to 1,000 m.

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[1]Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

RESULTS

A total of 108 stations was sampled by the Tsune Maru No. 31 during the 1989 cruise (Fig. 1). 106 of these were planned stations that had been fished in previous years of the survey, and two were additional, unplanned stations (stations 42b and 109). Two other planned stations (stations 35 and 36) were not sampled in 1989. The exact positions and depth ranges fished are listed in Table 1. In the Gulf of Alaska, all stations except one (station 63) were within ~1 nmi of their location in previous years. The locations of many stations in the Aleutian Islands and eastern Bering Sea, however, were moved as much as 5-10 nmi compared with previous years, mostly to avoid gear conflicts with numerous U.S. fishing vessels operating in the vicinity.

During the entire cruise, 17,215 hachis or 1,722 km (929 nmi) of longline gear were set. A total of 296,365 fish was caught on the 774,655 hooks set; thus, 38.3% of the hooks caught and retained fish.

Sablefish and Pacific cod made up most of the catch (Table 2). Sablefish comprised 39.8% (117,850 fish) of the catch in numbers, and Pacific cod, 27.1% (80,401 fish). Sablefish were most abundant in the Gulf of Alaska, and Pacific cod were most abundant in the eastern Bering Sea. Catch rates and average weights of sablefish and Pacific cod for each station are listed in Table 3. As many as 3,468 sablefish (station 102) and 4,002 Pacific cod (station 3) were caught at a single station. Catches of Pacific halibut were much lower than in previous years, especially in the Aleutian region and eastern Bering Sea. Rockfish were most abundant in the Aleutians and the eastern Gulf of Alaska; in all areas, most of the rockfish catch was either shortraker or rougheye rockfish. Nearly all the Greenland turbot catch was in the Aleutians or eastern Bering Sea. Grenadiers were most abundant in the Aleutians and western Gulf of Alaska.

In past years of the survey, killer whales often interfered with the longline operations at stations in the eastern Bering Sea by stripping hooked fish off the line. In the 1989 survey, however, killer whale problems were relatively minor and apparently had little or no effect on the survey results.

A total of 6,239 sablefish was tagged and released in the 1989 survey, 5.3% of all sablefish caught (Table 2). Most of the fish were tagged in the Gulf of Alaska. Since 1978, the cooperative longline survey has tagged and released a cumulative total of 148,546 sablefish in the survey area.

Otoliths were collected for the United States from 3,136 sablefish: 1,618 in the Aleutian region and eastern Bering Sea, and 1,518 in the Gulf of Alaska.

Detailed analyses of the survey results for sablefish, including length compositions and estimates of relative population numbers and weights, will be completed for the Gulf of Alaska by the AFSC Auke Bay Laboratory (ABL), and for the Aleutian region and eastern Bering Sea by the AFSC Resource Ecology and Fisheries Management Division. The 1989 results for the Gulf of Alaska will also be compared with results from another, concurrent longline survey in the Gulf (the 1989 domestic longline survey) by the AFSC Resource Assessment and Conservation Engineering Division (RACE). Preliminary results from all these analyses should be available from the AFSC by spring, 1990.

SCIENTIFIC PERSONNEL

10 May-15 Sept
Kiyoshi Fujii, North Pacific Cooperative Fisheries of Japan, Tokyo, Japan.

10 May-20 June
Ronald Payne, AFSC/RACE Division, Seattle.

21 June-20 July
Darlene Everhart, AFSC/RACE Division, Seattle.

21 July-18 Aug
Rebecca Renko, AFSC/RACE Division, Seattle.

19 Aug-15 Sept
Robin Harrison, AFSC/ABL, Auke Bay, Alaska.

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Table 1. Position and depth of each station, Japan-U.S. cooperative longline survey in the Aleutian region, eastern Bering Sea, and Gulf of Alaska, 1989.

Station number	Position at start of longline	Position at end of longline	Depth range shallow (m)	Depth range deep (m)
	Eastern Bering Sea			
1	58 39.7' 177 16.9'W	58 43.1' 177 30.4'W	150	730
2	58 36.8' 176 35.5'W	58 34.5' 176 49.5'W	155	580
3	58 40.0' 176 01.0'W	58 36.3' 176 15.3'W	140	180
4	58 30.7' 175 40.2'W	58 29.3' 175 52.9'W	180	750
5	58 30.9' 174 30.6'W	58 38.6' 174 23.5'W	151	180
6	58 17.4' 174 14.6'W	58 22.3' 174 24.7'W	145	700
7	57 52.0' 173 52.9'W	57 59.6' 173 54.3'W	132	240
8	57 37.5' 174 10.2'W	57 44.3' 174 16.0'W	160	830
9	57 03.0' 173 24.3'W	57 07.5' 173 18.0'W	133	200
10	56 49.2' 173 18.3'W	56 57.4' 173 23.5'W	150	230
11	56 38.1' 172 12.5'W	56 36.6' 172 29.2'W	162	300
12	56 35.0' 172 32.3'W	56 33.9' 172 45.2'W	160	240
13	56 27.7' 171 25.4'W	56 26.5' 171 39.6'W	174	840
14	56 15.3' 171 11.8'W	56 23.4' 171 17.2'W	143	190
15	56 09.3' 170 39.4'W	56 08.8' 170 51.4'W	160	770
16	56 06.0' 169 59.6'W	56 00.0' 169 51.0'W	125	700
17	56 04.1' 169 36.4'W	55 59.3' 169 49.1'W	165	880
18	56 17.5' 169 14.2'W	56 17.2' 169 30.3'W	160	220
19	56 05.7' 168 24.6'W	56 02.3' 168 10.9'W	150	240
20	55 50.0' 168 49.0'W	55 54.7' 169 00.0'W	165	800
21	55 30.1' 168 12.4'W	55 33.6' 168 26.6'W	170	220
22	55 22.8' 168 14.1'W	55 27.1' 168 01.9'W	165	800
23	55 03.5' 167 01.0'W	54 56.9' 167 12.4'W	155	240
24	54 58.6' 167 13.5'W	54 52.5' 167 13.5'W	210	260
25	54 48.5' 167 21.6'W	54 46.4' 167 34.0'W	500	840
26	54 28.5' 167 06.0'W	54 21.2' 167 11.7'W	500	900
27	54 34.3' 166 26.7'W	54 26.3' 166 33.2'W	420	550
28	54 40.7' 166 23.6'W	54 47.7' 166 15.5'W	180	310
29	54 48.8' 165 59.2'W	54 46.1' 166 12.8'W	165	210
30	54 28.5' 165 50.6'W	54 25.0' 166 03.1'W	447	610
31	54 07.2' 166 23.9'W	54 14.8' 166 24.4'W	177	880
32	53 44.2' 167 21.0'W	53 44.6' 167 27.1'W	130	900
33	53 36.2' 168 18.4'W	53 38.6' 168 04.2'W	135	900
34	53 13.0' 169 14.3'W	53 14.8' 169 10.8'W	610	780
109	56 59.6' 173 41.8'W	57 03.6' 173 55.4'W	460	680
	Aleutian Region			
35	not fished			
36	not fished			
37	52 32.3' 173 25.2'W	52 26.4' 173 35.9'W	210	800
38	52 33.0' 173 17.8'W	52 30.8' 173 30.6'W	190	220

Table 1 (continued).

Station number	Position at start of longline	Position at end of longline	Depth range shallow (m)	Depth range deep (m)
39	52 08.8' 175 37.4'W	52 10.3' 175 47.8'W	210	800
40	51 59.5' 176 27.6'W	52 04.7' 176 20.0'W	105	820
41	52 14.5' 179 35.9'W	52 06.5' 179 40.1'W	480	720
42a	52 07.0' 179 58.8'W	52 12.5' 179 52.6'W	110	122
42b	52 23.1' 179 36.9'W	52 16.6' 179 36.7'W	440	750
43	52 23.4' 179 34.2'E	52 29.4' 179 42.6'E	390	780
44	52 06.0' 176 17.8'E	52 07.3' 176 07.4'E	115	710
45	52 14.8' 175 13.2'E	52 11.9' 175 00.8'E	136	900
46	52 52.3' 172 50.0'E	missing	200	1200
47	52 31.2' 172 57.4'E	52 25.5' 172 52.4'E	150	735
48	52 19.8' 174 16.0'E	52 16.5' 174 06.0'E	123	700
49	51 41.9' 175 49.7'E	51 35.3' 175 41.0'E	125	750
50	51 41.2' 177 01.7'E	51 38.7' 176 49.5'E	450	810
51	51 40.5' 177 55.5'E	51 41.3' 177 44.2'E	443	790
52	51 24.7' 178 29.9'E	51 27.7' 178 21.7'E	630	830
53	51 24.6' 178 37.5'W	51 20.7' 178 29.5'W	140	720
54	51 45.8' 178 11.0'W	51 44.1' 178 23.3'W	100	800
55	51 35.0' 177 37.6'W	51 31.9' 177 49.1'W	195	700
56	51 32.7' 176 44.0'W	51 26.6' 176 53.1'W	220	670
57	51 43.8' 175 58.0'W	51 35.7' 176 03.2'W	180	680
58	51 46.3' 175 11.0'W	51 40.7' 175 24.2'W	360	970
59	51 46.8' 174 31.3'W	51 45.4' 174 45.8'W	560	840
60	52 02.2' 172 06.0'W	51 55.2' 172 15.8'W	115	900
61	52 25.5' 170 16.0'W	52 21.7' 170 29.6'W	212	880
	Gulf of Alaska			
62	52 35.1' 169 30.6'W	52 27.1' 169 30.4'W	175	740
63	52 59.6' 167 45.3'W	52 57.2' 167 59.1'W	123	200
64	53 10.7' 166 49.0'W	53 03.7' 166 55.0'W	270	820
65	53 33.5' 165 41.7'W	53 25.5' 165 45.9'W	175	700
66	53 44.0' 164 25.3'W	53 38.4' 164 33.6'W	153	750
67	53 58.3' 163 14.0'W	53 52.5' 163 22.4'W	140	700
68	54 04.8' 162 03.0'W	54 02.7' 162 15.0'W	120	700
69	54 19.2' 161 03.1'W	54 12.2' 161 10.1'W	150	810
70	54 21.9' 160 12.1'W	54 13.8' 160 16.1'W	150	660
71	54 29.7' 159 14.2'W	54 23.3' 159 22.1'W	155	830
72	54 37.5' 158 32.0'W	54 31.4' 158 39.3'W	160	750
73	54 50.3' 157 43.2'W	54 42.8' 157 50.4'W	180	720
74	55 13.0' 156 38.5'W	55 05.5' 156 43.2'W	290	860
75	55 38.0' 155 51.0'W	55 30.1' 155 48.2'W	150	235
76	55 44.3' 155 07.0'W	55 37.0' 155 12.1'W	190	650
77	55 59.0' 154 37.6'W	55 52.7' 154 49.2'W	410	800
78	55 58.9' 154 00.0'W	55 51.4' 154 03.2'W	200	700

Table 1 (continued).

Station number	Position at start of longline	Position at end of longline	Depth range shallow (m)	Depth range deep (m)
79	56 17.0' 153 00.0'W	56 13.4' 153 12.8'W	150	650
80	56 32.7' 152 03.0'W	56 26.0' 152 09.7'W	180	940
81	57 06.9' 151 14.6'W	56 59.9' 151 21.5'W	200	750
82	57 24.5' 150 35.0'W	57 16.0' 150 36.0'W	180	690
83	57 38.2' 149 52.6'W	57 30.1' 149 55.1'W	380	780
84	57 58.5' 149 08.8'W	57 50.9' 149 14.0'W	170	850
85	58 17.4' 148 38.0'W	58 10.7' 148 39.4'W	185	730
86	58 40.4' 148 17.5'W	58 33.2' 148 19.8'W	290	880
87	59 08.0' 148 38.3'W	58 59.8' 148 39.8'W	155	240
88	59 02.0' 147 53.0'W	58 56.1' 147 56.8'W	180	760
89	59 17.0' 146 50.0'W	59 10.2' 146 59.0'W	195	870
90	59 29.0' 145 25.8'W	59 28.1' 145 34.8'W	175	750
91	59 31.2' 144 41.5'W	59 27.3' 144 55.0'W	190	760
92	59 34.1' 143 35.5'W	59 28.0' 143 41.1'W	165	840
93	59 35.9' 142 30.5'W	59 30.0' 142 38.6'W	180	730
94	59 23.7' 142 09.0'W	59 28.1' 142 21.6'W	217	780
95	59 02.7' 141 21.0'W	59 01.0' 141 34.6'W	290	830
96	58 41.1' 140 39.0'W	58 42.7' 140 53.2'W	220	910
97	58 28.5' 139 29.0'W	58 25.3' 139 41.0'W	220	850
98	58 08.5' 138 44.0'W	58 10.8' 138 55.4'W	220	900
99	57 52.0' 137 22.5'W	57 53.6' 137 35.8'W	220	820
100	57 30.9' 136 31.4'W	57 36.6' 136 38.2'W	190	900
101	57 11.0' 136 15.0'W	57 15.9' 136 22.7'W	250	850
102	56 50.0' 136 01.0'W	56 57.1' 136 07.2'W	250	880
103	56 24.2' 135 25.6'W	56 20.0' 135 37.6'W	156	530
104	55 57.9' 135 25.0'W	56 01.0' 135 34.8'W	230	810
105	55 32.0' 134 58.6'W	55 37.3' 135 08.0'W	240	820
106	55 20.0' 134 43.5'W	55 22.9' 134 56.1'W	240	830
107	54 52.8' 134 17.5'W	54 59.7' 134 25.9'W	250	850
108	54 27.5' 133 55.0'W	54 32.5' 134 03.6'W	250	870

Table 2. Numbers of fish caught and sablefish tagged, by area[1], Japan-U.S. cooperative longline survey in the Aleutian region, eastern Bering Sea, and Gulf of Alaska, 1989.

Species	Western Aleutians	Eastern Aleutians	Bering I	Bering II	Bering III	Bering IV	Shumagin	Chirikof	Kodiak	Yakutat	South-eastern	Total
Sablefish	3,512	8,835	5,912	3,827	3,088	1,231	12,977	10,253	23,281	23,008	21,926	117,850
Pacific cod	7,396	9,374	1,584	19,854	18,204	15,576	4,223	2,243	989	736	222	80,401
Pacific halibut	228	198	24	312	104	10	196	131	140	105	169	1,617
Arrowtooth flounder	304	924	386	3,245	1,845	961	1,066	2,101	1,166	466	587	13,051
Greenland turbot	392	1,273	2,198	1,190	1,452	938	11	0	0	0	0	7,454
Rockfish[2]	1,243	888	161	62	47	39	523	450	493	1,225	951	6,082
Thornyheads	1,380	853	197	54	21	6	1,378	873	1,149	916	763	7,590
Grenadiers	5,909	10,630	430	698	1,393	1,547	9,998	6,949	5,690	3,524	1,158	47,926
Other	940	2,725	814	3,873	2,857	564	1,123	248	466	410	374	14,394
All species combined	21,304	35,700	11,706	33,115	29,011	20,872	31,495	23,248	33,374	30,390	26,150	296,365
No. of sablefish tagged	230	615	173	279	159	137	793	566	999	1,177	1,111	6,239
No. of stations	10	16	5	14	10	6	10	7	10	11	9	108

[1]For location of areas, see Figure 1.
[2]Includes all species of rockfish (Sebastes spp.); does not include thornyheads (Sebastolobus spp.).

Table 3. Catch rates and average weights of sablefish and Pacific cod at each station, Japan-U.S. cooperative longline survey in the Aleutian region, eastern Bering Sea, and Gulf of Alaska, 1989.

Station no.	Sablefish No. caught/ 100 hooks	Sablefish average round weight (lb)	Pacific cod No. caught/ 100 hooks	Pacific cod average round weight (lb)
		Bering IV		
1	4.47	7.5	26.63	11.2
2	1.39	6.3	44.31	11.3
3	0.00	-	55.58	11.4
4	5.76	6.5	15.04	9.0
5	0.00	-	49.82	9.4
6	5.47	6.7	24.96	9.0
		Bering III		
7	0.00	-	32.03	11.5
8	3.89	7.9	17.63	9.8
9	0.01	5.5	31.36	9.4
10	0.14	6.1	43.85	9.6
11	0.03	-	29.49	9.4
12	0.10	5.0	40.10	10.3
13	15.07	7.3	14.35	7.7
14	0.00	-	25.86	9.4
15	11.03	7.9	18.18	9.9
109	12.63	6.0	0.00	-
		Bering II		
16	12.03	7.7	24.49	10.1
17	6.36	7.1	23.46	10.1
18	1.21	5.3	17.25	8.4
19	0.01	-	44.28	8.6
20	9.93	6.8	21.07	9.8
21	0.00	-	31.97	10.6
22	1.32	6.5	37.46	10.1
23	0.00	-	26.49	9.2
24	0.00	-	15.49	8.8
25	3.47	5.3	0.00	-
26	1.63	5.3	0.00	-
27	16.86	5.4	0.00	-
28	0.01	5.1	23.08	6.9
29	0.32	5.4	10.72	9.7

Table 3 (continued).

Station no.	Sablefish No. caught/ 100 hooks	Sablefish average round weight (lb)	Pacific cod No. caught/ 100 hooks	Pacific cod average round weight (lb)
		Bering I		
30	10.74	5.3	0.00	-
31	7.47	5.9	4.50	13.8
32	13.69	7.5	11.08	10.3
33	13.15	7.6	6.42	10.1
34	37.06	6.2	0.00	-
		Eastern Aleutians		
35		not fished		
36		not fished		
37	21.39	6.1	1.13	11.5
38	0.01	-	30.50	11.6
39	11.31	6.5	5.89	8.3
40	13.51	8.1	19.21	6.3
41	9.96	9.0	0.00	-
42a	0.00	-	8.10	10.4
42b	4.79	8.8	0.00	-
		Western Aleutians		
43	3.93	9.1	0.00	-
44	2.68	8.4	35.03	11.0
45	1.56	10.8	31.99	7.7
46	4.54	8.9	0.88	6.0
47	4.01	8.8	9.13	8.3
48	1.18	7.8	18.96	7.0
49	3.92	9.1	6.76	17.4
50	11.10	10.1	0.00	-
51	8.38	8.3	0.00	-
52	7.60	9.3	0.00	-
		Eastern Aleutians		
53	4.44	8.2	6.83	5.4
54	1.46	7.5	4.51	6.1
55	4.94	6.4	14.54	6.7
56	4.58	6.5	13.85	7.1
57	4.97	6.0	9.13	8.5
58	13.71	6.1	0.56	6.2
59	15.88	7.3	0.01	6.2
60	7.86	8.0	4.93	6.4
61	7.38	7.5	12.56	5.8

Table 3 (continued).

Station no.	Sablefish No. caught/ 100 hooks	Sablefish average round weight (lb)	Pacific cod No. caught/ 100 hooks	Pacific cod average round weight (lb)
		Shumagin		
62	13.46	8.1	2.11	7.4
63	0.32	8.0	29.93	7.5
64	20.08	7.8	0.00	-
65	22.35	7.7	1.96	7.9
66	26.31	7.4	0.97	5.3
67	25.58	8.5	0.22	6.1
68	19.10	8.0	0.78	6.2
69	11.14	6.9	3.83	4.9
70	19.65	7.0	10.94	6.0
71	22.25	7.8	7.90	6.3
		Chirikof		
72	21.19	7.4	5.88	6.1
73	15.42	7.2	6.96	5.3
74	12.53	8.0	0.00	-
75	8.86	7.1	13.96	6.3
76	25.68	7.1	1.47	6.3
77	34.01	7.7	0.00	-
78	24.71	6.9	2.89	5.3
		Kodiak		
79	39.60	7.7	0.10	8.5
80	25.14	7.0	0.69	5.4
81	34.86	7.6	1.01	6.1
82	33.82	6.8	2.85	6.7
83	31.39	7.5	0.00	-
84	30.68	7.3	1.33	6.3
85	22.64	7.7	2.00	5.5
86	35.68	8.0	0.00	-
87	34.50	6.9	4.04	6.1
88	35.04	8.1	1.71	6.6

Table 3 (continued).

Station no.	Sablefish: No. caught/ 100 hooks	Sablefish: average round weight (lb)	Pacific cod: No. caught/ 100 hooks	Pacific cod: average round weight (lb)
		Yakutat		
89	41.93	8.2	1.54	6.4
90	19.53	7.5	1.33	7.2
91	33.61	7.7	1.79	7.8
92	27.60	7.9	2.57	7.1
93	30.60	8.1	0.26	7.9
94	18.03	8.3	2.71	7.5
95	30.64	8.3	0.00	-
96	19.04	8.1	0.01	16.5
97	33.72	7.8	0.00	-
98	32.40	8.5	0.00	-
99	32.46	8.6	0.00	-
		Southeastern		
100	43.31	8.0	0.00	-
101	41.85	7.6	0.00	-
102	48.17	8.4	0.00	-
103	16.04	6.0	2.81	8.4
104	29.18	6.4	0.15	6.0
105	37.32	6.8	0.10	6.6
106	36.71	7.1	0.03	5.5
107	28.08	7.6	0.00	-
108	23.88	7.5	0.00	-

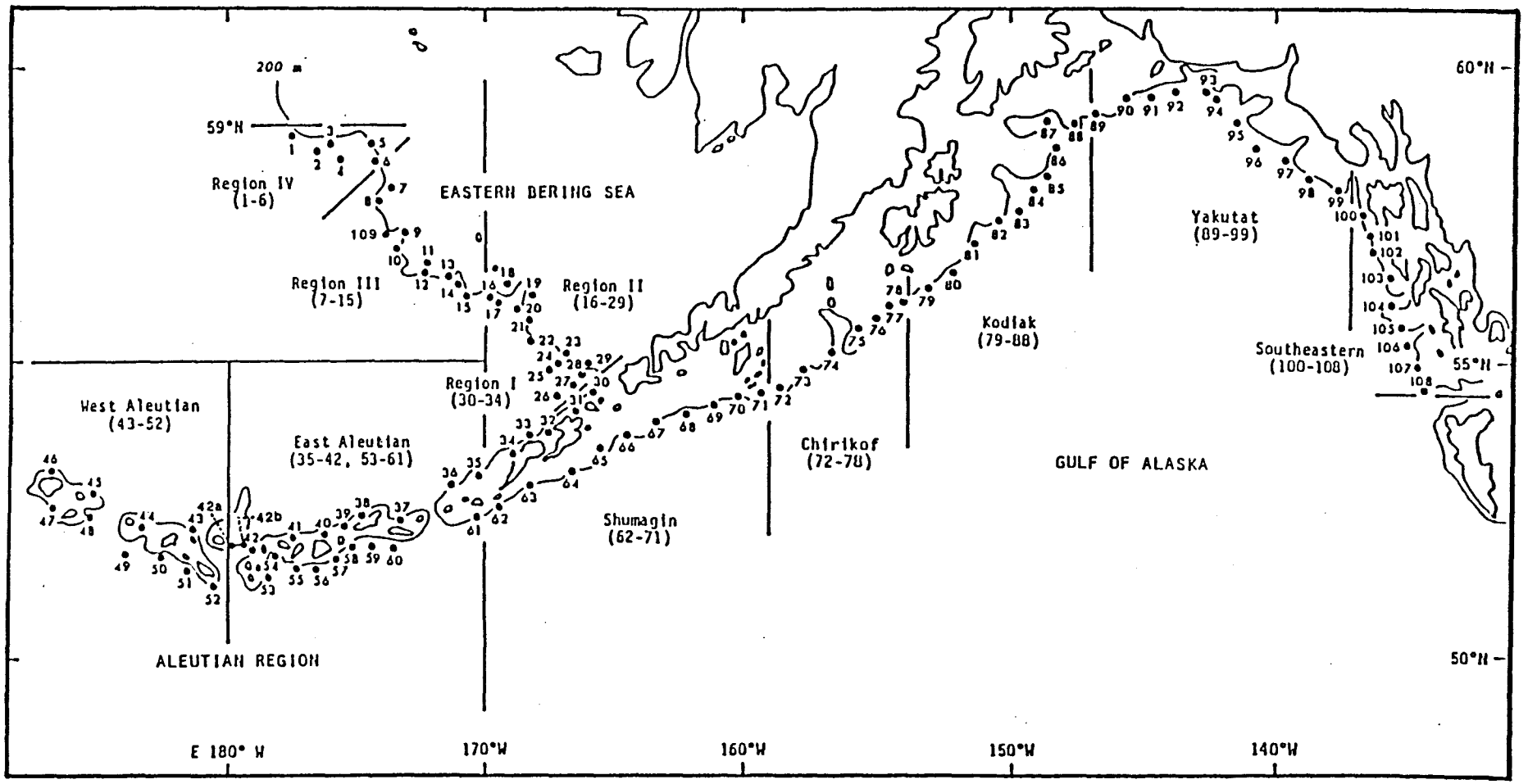

Figure 1. Location of stations, Japan-U.S. cooperative longline survey in the Aleutian region, eastern Bering Sea, and Gulf of Alaska, 1989. Stations 35 and 36 were not fished.